

Claims

1. A method of producing surgical grade calcium sulphate characterised in that the method comprises forming an initial calcium sulphate di-hydrate from synthetic constituents; dehydrating the initial calcium sulphate di-hydrate to form calcium sulphate anhydrite; and subsequently rehydrating the calcium sulphate anhydrite and allowing subsequent calcium sulphate di-hydrate to crystallise out.
2. A method according to claim 1, characterised in that the subsequent di-hydrate is used as a solid material bone filler.
3. A method according to claims 1 or 2, characterised in that the subsequent di-hydrate is formed into pellets.
4. A method according to claim 3, characterised in that the crystallised subsequent calcium sulphate di-hydrate is ground prior to forming into pellets.
5. A method according to claim 1, characterised in that the subsequent calcium sulphate di-hydrate is calcined to form calcium sulphate hemi-hydrate.
6. A method according to claim 5, characterised in that the calcium sulphate hemi-hydrate is mixed with water to form a settable paste.
7. A method according to claim 5, characterised in that the calcium sulphate hemi-hydrate is mixed with a salt solution to form a settable paste.
8. A method according to any of claims 5 to 7, characterised in that the calcining is hydrothermal to form α calcium sulphate hemi-hydrate.
9. A method according to claim 8, characterised in that the calcining is carried out in an autoclave.

10. A method according to claim 9, characterised in that the calcining is carried out at a pressure of 1-6 bar.

11. A method according to claim 10, characterised in that the calcining is carried out at 2-3 bar.

12. A method according to any of claims 5 to 7, characterised in that the calcining is carried out in dry heat conditions.

13. A method according to claim 12, characterised in that the calcining is carried out at a temperature of 70 - 200°C.

14. A method according to claim 13, characterised in that the calcining is carried out at 150 - 175°C.

15. A method according to any of claims 8 to 14, characterised in that the calcining is carried out for a period of a half to six hours.

16. A method according to claim 15, characterised in that the calcining is carried out for one to two hours.

17. A method according to any of claims 5 to 15, characterised in that following calcining, the calcium sulphate hemi-hydrate is ground to a powder.

18. A method according to claim 17, characterised in that the powder has particle size of less than 150 microns.

19. A method according to any of the previous claims, characterised in that the initial calcium sulphate di-hydrate is formed by mixing soluble calcium and sulphate salts such that calcium sulphate precipitates out.

20. A method according to claim 19, characterised in that the initial di-hydrate thus formed is washed, and subsequently filtered, crushed and/or

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~~dried.~~

21. A method according to claims 19 or 20, characterised in that the calcium salt is a chloride.

22. A method according to claims 19 or 20, characterised in that the calcium salt is a nitrate.

23. A method according to any of claims 19 to 22, characterised in that the sulphate is a sodium salt.

24. A method according to any of claims 19 to 22, characterised in that the sulphate is a potassium salt.

25. A method according to any of claims 19 to 22, characterised in that the sulphate is an ammonium salt.

26. A method according to any of claims 19 to 25, characterised in that the calcium and sulphate salts are provided in a substantially equal molecular ratio.

27. A method according to any of claims 1 to 18, characterised in that the initial calcium sulphate di-hydrate is formed from neutralising lime with sulphuric acid.

28. A method according to any of the previous claims, characterised in that the dehydration of the initial calcium sulphate di-hydrate takes place within a temperature range 110 - 350°C.

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29. A method according to claim 28, characterised in that the dehydration of the initial calcium sulphate di-hydrate takes place at less than 300°C.

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30. A method according to any of claims 1 to 27, characterised in that the dehydration of the initial calcium sulphate di-hydrate takes place at a

temperature above 350°C to form insoluble anhydrite.

31. A method according to claim 30, characterised in that the rehydration takes more than five days.

32. A method according to any of the preceding claims, characterised in that the dehydration of the initial calcium sulphate di-hydrate by the application of heat takes place in an open container.

33. A method according to any of claims 1 to 31, characterised in that the dehydration of the initial calcium sulphate di-hydrate by the application of heat takes place in a closed container.

34. A method according to any of the preceding claims, characterised in that the dehydration of the initial calcium sulphate di-hydrate by the application of heat takes place hydrothermally in the presence of steam.

35. A method according to any of the preceding claims, characterised in that the rehydration of the calcium sulphate anhydrite takes place immediately following dehydration.

36. A method according to any of the preceding claims, characterised in that the calcium sulphate anhydrite is fully immersed in water for rehydration.

37. A method according to any of claims 1 to 35, characterised in that the calcium sulphate anhydrite is fully immersed in a dilute salt solution for rehydration.

38. A method according to claim 37, characterised in that the salt solution comprises succinic acid.

39. A method according to claim 37, characterised in that the salt solution comprises potassium sulphate solution.

40. A method according to any of claims 37 to 39, characterised in that the concentration of the salt solution is less than 1%.

41. A method according to claim 40, characterised in that the concentration of the salt solution is substantially 0.1%.

42. A method according to any of the previous claims, characterised in that finely powdered calcium sulphate di-hydrate is added to be present during rehydration such that the powdered calcium sulphate acts as crystal seeds.

43. A method according to claim 42, characterised in that addition is in the order of 5g per litre of water.

44. A method according to claims 28 or 29, or any of claims 32 to 43 when dependent on claims 28 or 29, characterised in that the rehydration takes less than five days.

45. A method according to any of the preceding claims, characterised in that the subsequent calcium sulphate di-hydrate is dried following crystallisation.

46. A method according to claim 8, or any of claims 9 to 44 when dependent on claim 8, characterised in that the subsequent calcium sulphate di-hydrate is held in a damp condition prior to calcining.

47. Any novel subject matter or combination including novel subject matter disclosed herein, whether or not within the scope of or relating to the same invention as any of the preceding claims.

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